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1. Title of Invention
Polyester Fibers for Fiberfill

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5. List of Attachments

(1)	Specification	1 copy
(2)	Carbon Copy of Application	1 copy
(3)	Power of Attorney	1 copy

SPECIFICATION

1. Title of Invention

Polyester Fibers for Fiberfill

2. Claim

A polyester fiber for fiberfill comprised of a 3-dimensionally crimped polyester fiber wherein the post-spinning heat history is in the range 100-130°C.

Detailed Description of the Invention

The present invention relates to a polyester fiber for fiberfill . It further relates to a polyester fiber that is suitable for a stuffing material, particularly for fiberfill in bedding comforters, pillows, and cushions.

In general, a large number of natural and synthetic fibers such as cotton, polyester, polyamide, polyacryonitrile, polypropylene, and the like, have been applied as fiberfill materials; in particular, synthetic fibers have been preferred fiberfill materials, in view of their lighter weight than cotton and their rich bulkiness because the synthetic fibers permit one to artificially vary the fiber denier and crimp configuration and because of the fact that the production of fibers with 3-dimensional crimps has been made possible for conjugated fibers by advances in technology.

However, it is also undeniable that such bedding material is still inferior to feather bedding comforters which have been considered heretofore to be the highest class material in terms of comforter feel, compliance along the skin, and bulkiness retention, and so on.

The present invention was arrived at as a result of extensive studies by the present inventors on polyester fiber-based fiberfill, in order to maintain the advantages of the lightness and bulkiness as described above, and at the same time, to incorporate the feel and hand such as compliance along the skin etc. as is provided by feather comforter bedding materials.

That is, the present invention is a polyester fiber for fiberfill comprised of a 3-dimensionally crimped polyester fiber wherein the post-spinning heat history is in the range 100-130°C.

In the conventional manufacture of 3-dimensionally crimped polyester fibers, their self-crimping capability has normally been utilized, with the crimp formation having been made under relaxed conditions or a heat treatment at high temperature of 140°C or above. This made the fiber coarse and fiberfill using such fibers showed a considerably damaged hand.

Fiberfill is normally made into products by a simple fabrication step, that is, simply passing the raw material fiber into a carding machine or the like, so that the properties of the starting fiber are directly translated into product quality, in particular, the coarse hand of a starting fiber will be transferred unmodified to the product.

In the present invention, it was discovered that for overcoming the above deficiencies in the polyester fibers for fiberfill, maintaining the post-spinning fiber heat history in the 100-130°C range, particularly at 110-125°C turned out to be particularly effective.

In the case of polyester fibers, particularly after a conventional heat treatment, oligomers bleed to the fiber surface, making the fiber even coarser, which can be fully prevented if the heat history is held within the above range. The term "heat history" encompasses the total heat history that the polyester fibers receive in the process of completion of the process of converting them into a fiberfill material after spinning (specifically in terms of a substantial heat treatment temperature); in general, the history is often defined by a crimp formation treatment or a thermal effect during heat setting.

The polyester fibers in this invention can comprise at least 85 mole % of polyethylene terephthalate as a constituting component, as well as other bi-functional compounds such as isophthalic acid, adipic acid, and the like, a polyfunctional compound such as trimellitic acid, pyromellitic acid, and the like, a series of aliphatic diols such as butane diol, polyfunctional compounds such as pentaerythritol compound, as well as a variety of additives such as a catalyst, pigment, dye, antistatic agent, viscosity improver, surface modifier, and the like.

Based on the anisotropy of the fiber cross-section of the said fiber, a 3-dimensional crimp is generated by a suitable heat treatment that satisfies the heat history defined by the present invention. The anisotropy of the fiber cross-section is generated by a method of conjugate spinning at least 2 polymers normally different in physical or chemical compositions or by cooling one side and spinning, which essentially enables the fiber to have a latent self-crimp formation capability.

In order for the fibers to further satisfy the bulk properties desired

for fiberfill, bulk retention, resiliency, hand and so on, the fiber cross-sectional configuration, denier, number of crimps, and percent crimping, etc. are suitably selected, among which, flattening the cross-sectional shape of the polyester conjugate fibers is most effective.

As described above, the present invention is characterized by defining the post-spinning heat history for the polyester fibers used for fiberfill, which provides polyester fibers, which are not only lightweight and have rich bulkiness, but also have considerable improvements in touch and skin compliance and so on, as fiberfill due to the softness of the raw material fiber.

The present invention is specifically explained by examples of this invention.

Example 1

Polyethylene terephthalates having inherent viscosities (0.66 and 0.57 as measured in orthochlorophenol at 25πC) as conjugating components were spun and by the usual conjugate spinning process (conjugation ratio 1/1), followed by drawing. The drawn tow was partly cut into a 75mm length [staple fiber A]; this and the remaining tow [tow B] were both subjected to a relaxation heat treatment without any other modification at 120°C to cause crimps to develop. From among the crimped fibers, staple fiber (A) was subjected to the usual carding machine to make a web layer while the tow fiber (B) was opened by an opening machine comprised of a combination of equipment disclosed in Japanese Patent Application Publication S40-22004 and 45-33844. These opened fiber samples (A) and (B) were used to construct bedding comforters (150cm wide, 200mm long, and 1.5kg filled) on which a sensory test was carried out. The results showed that both (A) and (B) gave a soft touch and light and warm comfortable feel as comforters. Table 1 shows the fiber characteristics and the thickness of the comforters.

Table

Fiber (Comforter) Type		A	B
Fiber Properties	Denier	6.0	6.0
	Tenacity (g/d)	5.03	5.00
	Elongation (%)	31.4	32.1
	No. of Crimps (crimps/25mm)	9.5	9.6
	Percent Crimping (%)	22.9	23.1
Comforter Thickness (cm)		9	9
Note (Fiber Configuration)		Stable Fiber	Tow

Comparative Example 1

Example 1 was repeated except for using 2 polyethylene terephthalates having inherent viscosities of 0.66 and 0.56 as in Example 1 in carrying out a crimp formation by a relaxation heat treatment at 140πC to fabricate comforters C and D, on which a sensory test was carried out.

The results showed that both C and D had a coarse hand leaving an impression of inferior quality comforters. Table 2 shows the fiber properties and comforter thicknesses. These are in agreement with the physical properties of the present invention described in Example 1, but the effective features of this invention are confirmed by a sensory evaluation.

Table 2

	Fiber (Comforter) Type	C	D
Fiber Properties	Denier	6.0	6.0
	Tenacity (g/d)	4.95	4.98
	Elongation (%)	35.6	36.2
	No. of Crimps (crimps/25mm)	9.0	9.1
	Percent Crimping (%)	20.8	20.7
Comforter Thickness (cm)		9	9
Note (Fiber Configuration)		Stable Fiber	Tow

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